REMARKS

Claims 4 – 13 were pending in this application. In this response, a clarifying amendment is made to claim 4. Thus, claims 4 – 13 remain pending.

Rejection of Claims 4 – 10, 12 – 13 Under 35 U.S.C. § 103(a)

Claims 4 – 10, 12 – 13 remain rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Verard (Fully automatic identification of AC and PC landmarks on brain MRI using scene analysis) and Sun (Anatomic labeling of PET brain images with automatic detection of AC and PC). In addition, claim 11 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Verard in view of Nowinski (WO02/43003).

In response to the Applicant's previous submissions against the rejections of claims 4 – 13, the Examiner alleges that the features upon which Applicants rely on are not recited in the rejected claims. Applicants respectfully disagree with the Examiner.

Applicants respectfully submit that the features relied on in the previous submissions (features (i) and (ii) as listed below) are clearly recited in independent claim 4 (as steps (b) and (c) respectively) as shown in the Listing of Claims.
(i) "using the estimated position of the AC or PC landmarks to generate one or more axial or coronal radiological images, including at least one image including the estimated position of the AC or PC landmark"
(ii) "analysing the axial or coronal radiological images to improve the estimate of the position of the AC or PC landmarks".

The Examiner has also alleged that since Verard teaches a fully automated identification of AC and PC landmarks in the brain using MRI and the method in Verard includes the step of taking a midsagittal image of the brain, setting an initial threshold of the pixel intensity, and then iteratively modifying threshold levels until successful identification of brain structures such as the AC and PC

(page 613 column 2 lines 15 – 19 and page 614 column 2 lines 6 to page 615 column 1 line 24 cited), claims 4 – 13 are obvious in view of Verard and Sun. Applicants respectfully disagree

Applicants respectfully submit that the sections of Verard cited by the Examiner clearly do not disclose or suggest feature (i) or (ii) of claim 4. In fact, nowhere in Verard discloses or suggests feature (i) or (ii).

As stated in the Applicant's previous submission, Verard discloses that the positions of the PC and AC landmarks are found using a step-by-step procedure performed on a midsagittal image (Verard, Fig. 2(b) caption). The section on "Localization of the PC and the AC" in Verard (which is cited by the Examiner) merely discloses that the identification of the superior Co allows one to draw a small window B2 (in the midsagittal image, as shown in Fig. 2(b)) which includes the PC with certainty. Two convolution masks are then applied to the pixels located inside the window B2 to obtain a coarse localization of the PC and this coarse position is fine grained by applying a second matched filter inside a smaller region, centered on the previously found PC position (in the midsagittal image). The position of the AC is found by applying a similar process as was described for the PC. Clearly, Verard only teaches steps which operate on a midsagittal image and does not teach or suggest using the coarse localization of the PC as estimated on the midsagittal image to generate one or more axial or coronal radiological images and analyzing the axial or coronal radiological images to improve the estimate of the position of the PC. Therefore, Verard does not disclose or suggest feature (i) or feature (ii) of claim 4.

The Examiner has further alleged that Sun teaches the deficiency of Verard by teaching feature (ii) of claim 4. More specifically, the Examiner alleges that Sun teaches the automatic method of finding the AC and PC by estimating the positions of these landmarks using midsagittal radiological images, generating axial radiological images and analyzing these axial radiological images to improve the estimates of the positions of the landmarks (figure 3 and caption cited). Applicants respectfully disagree with the Examiner.

As stated in the Applicant's previous submissions which have not been addressed by the Examiner, in Sun (in particular figure 3 and the caption as cited by the Examiner), the axial and coronal slices of the AC and PC are only used for labeling with the help of the Talairach's atlas, and are not used to improve the estimated position of the AC or the PC landmark (See also Sun page 58 last line of left column to line 2 of right column which discloses the aim of Figure 3, which is to show that any PET images which are in Talairach space can be labeled). Clearly, Sun does not disclose or suggest that the axial and coronal slices can be used to improve the estimated positions of the AC or PC landmarks.

By generating one or more axial or coronal radiological images from the estimated position of the AC or PC landmark and by analyzing these axial or coronal radiological images to improve the estimated position of the AC or PC landmark, the final positions of the AC or PC landmark can be found using information obtained from all three orientations. The final estimated position of the AC or PC landmark would therefore be more accurate. Such an advantage cannot be achieved by either Verard or Sun.

For at least the reasons above, Verard and Sun, alone or in combination, fail to disclose or suggest the subject matter of independent claim 4 and of dependent claims 5 – 13, and the Office Action fails to establish a *prima facie* case of obviousness.

Furthermore, as stated in the Applicants' previous submissions which have not been addressed by the Examiner, in addition to claims 5 – 8 being allowable as depending on an allowable independent claim, the features of each of claims 5 – 8 further patentably distinguish each of these claims over the cited documents. The Applicants' previous submissions with regard to these claims are reproduced as follows. Applicants respectfully request the Examiner to address these submissions.

Claim 5 recites *inter alia*, "deriving a mean ventricular line (MVL) and determining the position of the AC or PC landmarks by scanning intensity values along the MVL". As stated on page 12 line 29 to page 13 line 2 of the present application, for the AC reference slice containing the estimated position of the AC landmark and each of the four slices derived from it, a mean ventricular

line (MVL) passing through the third ventricle is formed by using the horizontal and vertical projections of the corresponding slice. A MVL is also formed from the PC reference slice and the slices derived from it in the same manner (page 14, lines 13 – 15). Applicants submit that neither Verard nor Sun teaches or suggests such a MVL. Page 615 col. 1 line 24, column 2 lines 1 – 45 of Verard (as cited by the Examiner) merely discloses the mean of differences between automatic calculation and manual pointing of the AC and PC landmarks and the standard deviation for both axial and coronal angulations. Clearly, Verard does not disclose or suggest deriving a MVL and certainly, does not teach or suggest determining the position of the AC or PC landmark by using a MVL. Therefore, in addition to claim 5 being allowable as depending on an allowable independent claim, the features of claim 5 further patentably distinguish this claim over the cited documents.

Claim 6 recites *inter alia*, "axial slices including a first axial image of an axial slice containing the estimates of the position of the AC or PC landmarks...second images of neighbouring axial slices...determining dimensions of the AC or PC landmarks using the second images". As discussed above, neither Verard nor Sun discloses or suggests operating on axial slices including an axial slice containing an estimate of the AC or PC landmark. Therefore, in addition to claim 6 being allowable as depending on an allowable independent claim, the features of claim 6 further patentably distinguish this claim over the cited documents.

Claim 7 recites *inter alia*, "images are coronal images...deriving a symmetry line within a first coronal image including estimates of the position of the AC or PC landmarks, and determining the position of the landmark by scanning intensity values along the symmetry line". As discussed above, neither Verard nor Sun discloses or suggests operating on coronal images including a coronal image containing an estimate of the position of the AC or PC landmark. Furthermore, Verard and Sun do not teach or suggest deriving a symmetry line and determining the position of the landmark using the symmetry line. The steps disclosed in page 613, column 2 of Verard (as cited by the Examiner) do not result in any symmetry line and are clearly meant for obtaining a pseudo midsagittal image and not for determining the position of any landmark. Therefore, in addition to claim 7 being allowable as depending on an allowable independent claim, the features of claim 7 further patentably distinguish this claim over the cited documents.

Claim 8 recites *inter alia*, "images relating to different coronal slices including second images of coronal slices neighbouring the first coronal slice, … determining dimensions of the AC or PC landmarks using the second images". As discussed above, neither Verard nor Sun discloses or suggests operating on coronal images including a coronal image containing an estimate of the AC or PC landmark. Further, neither Verard nor Sun discloses determining dimensions of the AC or PC landmark. Page 612 column 1 in Verard (as cited by the Examiner) merely discloses calculating parameters of an ellipse (which is used to model transaxial slices) to determine the axial misorientation angle which can in turn be used to identify the interhemispheric fissure from which the midsagittal plane can be constructed. Clearly, page 612 column 1 in Verard does not disclose determining dimensions of the AC or PC landmark. Therefore, in addition to claim 8 being allowable as depending on an allowable independent claim, the features of claim 8 further patentably distinguish this claim over the cited documents.
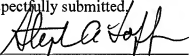
In view of the above, Verard and Sun, alone or in combination, fail to disclose or suggest the subject matter of claims 4 – 13, and withdrawal of the rejection of these claims is respectfully requested.

Allowance of all pending claims is solicited.

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Respectfully submitted,

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